



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/757,123	01/09/2001	Satish Athavale	01P7408US	6586

7590 09/29/2003

Siemens Corporation
Intellectual Property Department
186 Wood Avenue South
Iselin, NJ 08830

EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 09/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/757,123

Applicant(s)

ATHAVALA ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23-25, 30 and 31 is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-21 and 26-29 is/are rejected.
- 7) ☒ Claim(s) 12 and 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/28/03 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-11, 13-21, 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cathey (US 5,409,563) and Muller et al. (US 5,605,600).

Cathey describes a method for etching silicon substrate (col. 5, line 7) comprising providing rf pallet which supporting substrate to be etched and connected to an rf power source (col. 4, line 31-36) (claimed securing a wafer to an electrode in a plasma chamber); heating the substrate to a T about 300-1100 degrees Celsius (col. 4, line 52-col. 5, line 5) (claimed T of greater than 200 degrees Celsius or this would also includes claimed T of 200-450 degrees Celsius); exposing the wafer to a reactive plasma to etch deep trenches into the silicon substrate (col. 4, line 36-37; col. 5, line 6-10). Unlike claimed invention, Cathey doesn't describe the deep

Art Unit: 1765

trenches have a depth of greater than 8 μm . However, he describes the trench for capacitors having a high aspect ratio trench with a depth that is much greater than its width such as at least 5:1 is preferred and as high as 40:1 ratio (col. 1, line 40-49). Muller describes a width for a trench capacitors requires openings (or width) approximately 0.3-0.5 μm (col. 3, line 24, 25). At a width of 0.3 μm , a ratio 5:1 depth trench would be 1.5 μm and a ratio of 40:1 would be 12 μm . At a width of 0.5 μm , a ratio of 5:1 depth trench would be 2.5 μm and a ratio of 40:1 would be 20 μm . This range would include claimed of greater than 8 μm depth trench. Furthermore, Muller also describes such a trench for capacitors require trenches having a depth of 8 μm (col. 3, line 23-25). Therefore, given the depth range above, it would have been obvious for one skill in the art to determine the trench depth through routine experimentation to provide an optimum trench depth to form capacitors with a reasonable expectation of success.

Referring to claims 3, 4, 14, Cathey also describes that the pallet 30 (or claimed electrode) and the substrate may also be heated with an element (col. 4, line 65-68). Since the substrate is heated on top of the pallet, and they are both in the plasma chamber (figure 4), the substrate and pallet would have about the same T.

Referring to claims 6, 7, 16, 17, Cathey describes the etching gas comprises chlorine and noble gas (or claimed Ar) (claim 8).

Referring to claims 8, 9, 18, 19, Cathey describes the etching gas comprises of nitrogen or oxygen (claimed additive gases to increases selectivity between an etch mask and the substrate) (claim 8).

Referring to claim 13, the apparatus for the processing the wafer providing the pallet to support the substrate having n clamp (claimed securing the wafer to the electrode in unclamped

Art Unit: 1765

state) and since the gases in the plasma are heated and bombard the substrate for etching (col. 4, line 52-64), the substrate would also be heated by the gases in the plasma.

Referring to claims 10, 11, 20, 21, Cathey doesn't describes the flow rates of the oxygen or nitrogen. However, he shows that the mole of gas (or flow rate) used is a result-effective variable that would affect etching rate (col. 5, line 60-coo. 6, line 30). Therefore, it would have been obvious for one skilled in the art to determine the flow rate of the gases used such as oxygen or nitrogen through routine experimentation in order to obtain optimum flow rate to etch the substrate with a reasonable expectation of success.

Referring to claims 5, 15, 26, 28, Muller further describes other apparatus that can be used for the etching of the substrate including electrostatic chuck (col. 4, line 40), which would clamped to secure the substrate and He is supplied at the P range of 1-10 Torr to assure heat transfer between the wafer the electrode.

Allowable Subject Matter

4. Claims 12, 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 12 and 22 are allowable because applied prior art doesn't describe etching the wafer with reactive plasma including Cl₂, BCl₃, Ar, O₂, and N₂.

Claims 23-25, 30, 31 are allowed for the same above reason.

Response to Arguments

5. Applicant's arguments with respect to claims 1-11, 13-21, 26-29 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

6. Claims 3 and 4 are objected to because of the following informalities: they are the same and both depend on the same claim 1. Appropriate correction is required.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
9/11/03

NADINE G. NORTON
PRIMARY EXAMINER

